



NEW WESTMINSTER AREA STUDY

Prepared by UMA Engineering Ltd.

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INTRODUCTION

In 1998, MoTH contracted with UMA Engineering Ltd., working with Golder Associates Ltd., CWMM Consulting Engineers Ltd. and Arthur Andersen LLP, to undertake the New Westminster Area Network Study. The study's primary objective was to develop and evaluate long-term network improvements in the following two corridors, shown in Fig 1:

The North-South Corridor would use one or more of the following elements to form a continuous link between Highways 1 and 91, emphasizing the movement of people:

- increased capacity across the North Arm of the Fraser River, either via improvements to the Queensborough Bridge corridor or via a new link in the vicinity of Tree Island
- the Marine-10th Connector, providing a new link from the intersection of Marine Drive and Byrne Road to the intersection of 10th Avenue at 20th Street
- improvements to the 10th Avenue corridor
- the Stormont-McBride Connector, linking the intersection of 10th Avenue and McBride Boulevard to the Cariboo interchange on Highway 1

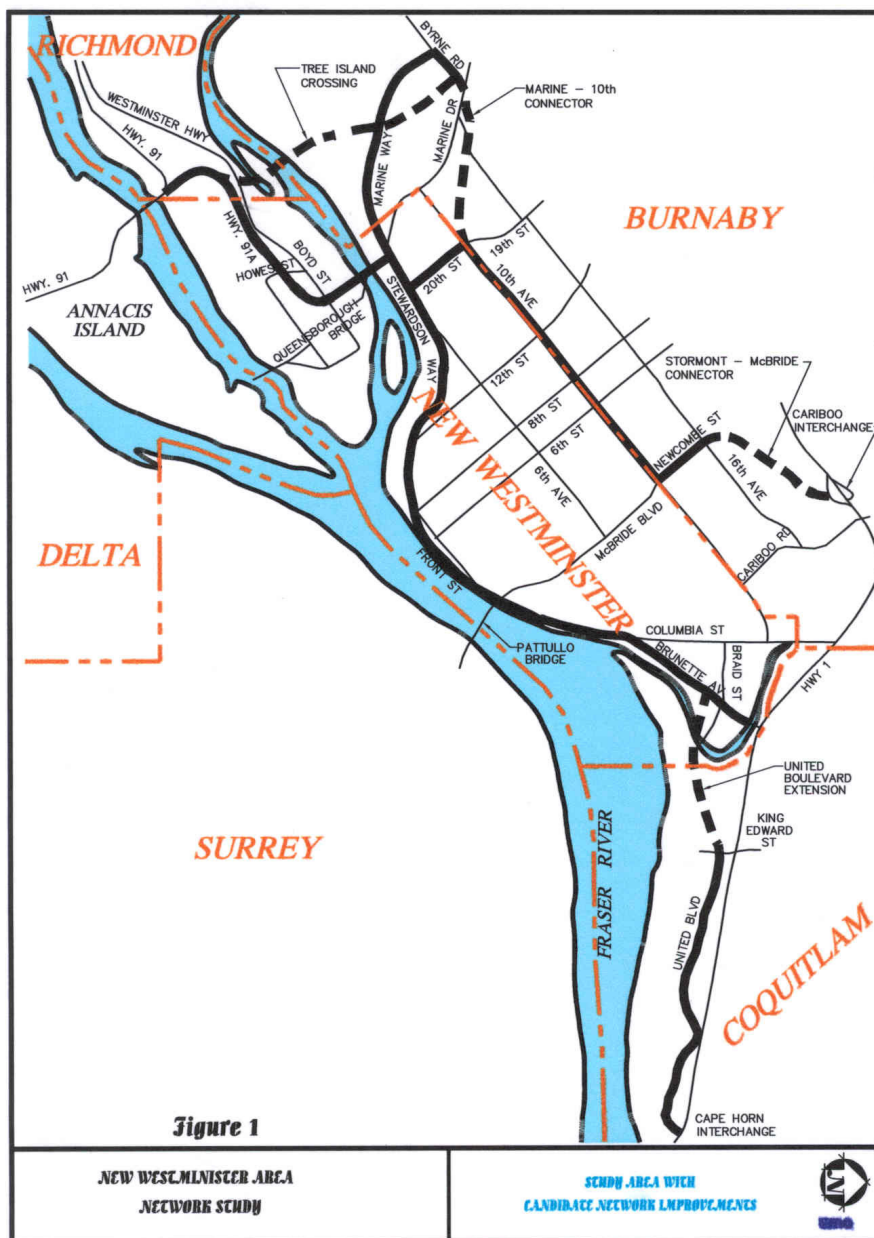
The East-West Corridor would emphasize goods movement, and incorporate improvements to one or more of the following:

- Stewardson Way
- Front Street around downtown New Westminster
- Columbia Street and Brunette Avenue leading towards Coquitlam
- United Boulevard through Coquitlam to the Cape Horn interchange, including the new United Boulevard Extension from King Edward Street to Brunette Avenue

The study was sponsored by the Ministry of Transportation and Highways and the BC Transportation Financing Authority. Some of the subject roads are under provincial jurisdiction, while others are regional or municipal. The study developed a series of findings to facilitate decision-making activities among interested parties.

Other agencies consulted for the project included the Greater Vancouver Regional District, TransLink, Insurance Corporation of BC, and the four municipalities represented in the Study Area: New Westminster, Burnaby, Coquitlam, and Richmond. However, the final document reflects the findings of the provincial consultant, and not necessarily the policies of all agencies.

The project was divided into four phases, presented below: Background Profile, System-Level Analysis, Initial Multiple Accounts Evaluation (Initial MAE), and Final MAE.



PHASE 1: BACKGROUND PROFILE

The background profile assembled information from earlier studies on the following topics:

- Transportation looked at existing and future road conditions. Traffic volumes are high, including many through trips that neither begin nor end in the Study Area. Congestion is common at many locations, leading to higher travel times and safety concerns at some locations. Roads in the East-West Corridor have an above-average concentration of truck traffic. Left untreated, problems in the Study Area will get worse as the region grows.
- Socio-Community Overview examined the present and future land uses. The study corridors are primarily urban. Large industrial zones currently exist around the Queensborough Bridge in New Westminster, the Big Bend site in Burnaby, and the United Boulevard corridor in Coquitlam. Future industrial/business park development will primarily be confined to these areas. Residential uses exist at various locations throughout both of the corridors. Future residential development will focus in certain communities, such as the Edmonds Town Centre and Cariboo Heights areas of Burnaby. Major open spaces include the Big Bend area, the lands along Byrne Creek, and the George Derby/Brunette River Conservation Area immediately south of Highway 1 and Gaglardi Way.
- Environmental Impact Assessment focused on rivers and creeks that could be impacted by road construction: the North Arm of the Fraser River, Byrne Creek, and the Brunette River. The natural areas mentioned above were also examined. The findings revealed that the proposed Tree Island Crossing would be constructed in a highly productive and diverse area of the Fraser River, raising the potential for undesirable habitat alienation and alteration. The Stormont-McBride Connector would disrupt wildlife, vegetation and drainage on the George Derby lands and adjacent parkland. Both of these projects would require appropriate mitigation measures.
- Environmental Site Assessment identified properties that may have soil and/or groundwater contamination. A preliminary risk evaluation was developed on the basis of historical and current land use. Higher-risk sites tended to be concentrated in existing or historical industrial areas, in the Tree Island area as well as eastern New Westminster. These sites would require treatment before any roads can be built on them.
- Sub-Surface Conditions examined geotechnical issues that might affect road development. Primary concerns are in the Queensborough, Tree Island, Big Bend and Fraser Mills areas, where the soils are highly compressible. This would affect the design and cost of road construction.

NEW WESTMINSTER AREA STUDY LEVEL 3

Consultant's Key Findings

The following Concepts were carried through from the Initial MAE for further analysis in the Final MAE:

1. Concept 1A: Queensborough Bridge twinning, 4+2 lanes, Marine Way interchange with directional ramps, 20th Street 2+2 lanes
2. Concept 1B: as above but Marine Way interchange had loop ramps
3. Concept 2A: Tree Island Crossing 2+2 lanes from Highway 91A (with loop ramps) to a partial interchange at Marine Way and continuing along the Meadow Avenue alignment to Byrne Road
4. Concept 3A: Marine-10th Connector and 10th Avenue upgrading, 2+2 lanes
5. Concept 3B: as above but with 4+0 lanes
6. Concept 4A: Stormont-McBride Connector at-grade, 2+2 lanes
7. Concept 4B: Stormont-McBride Connector in a trench, 2+2 lanes. The trench option was introduced at the start of the Final MAE, in response to concerns regarding the at-grade concept. This Concept places the Connector in an open trench, allowing for a pedestrian overpass at 13th Avenue and a vehicular crossing at 16th Avenue. It therefore represents the "middle ground" between the at-grade and full-tunnel alternatives.
8. Concept 5A: East-West Corridor including United Boulevard Extension, with 4+0 lanes
9. Concept 5B: East-West Corridor including United Boulevard Extension, with 2+2 HPV lanes, though a 2+0 configuration was retained on Front Street
10. Concept 5C: as above but with widening of Columbia Street from Brunette Avenue to Front Street to provide 4+2 HPV lanes

The Final MAE had the same accounts as the Initial MAE, but they were evaluated in greater detail. In addition, government costs were compared with the dollar value of user benefits by calculating a Net Present Value (NPV), calculated as total benefits minus total costs, with 0 being break-even.

In the North-South Corridor:

1. Concept 1A was the widening of Highway 91A to six lanes, consisting of two GP lanes and one HOV lane in either direction. This was accompanied by a diamond interchange to replace the Howes Street intersection. The existing Queensborough Bridge was converted to southbound use only, and a parallel bridge was provided for northbound traffic. A rebuilt interchange at Marine Way featured directional ramps for improved operations. Twentieth Street was reconfigured to have one GP lane and one HOV lane in either direction. At \$126 million, this was the least expensive Concept for crossing the Fraser River. It

provided additional capacity, increased mobility, decreased travel times, improved safety, and improved conditions for HOVs, inter-regional trips, trucking, cycling and pedestrians. Neighbourhood impacts were relatively modest. The Concept had a strong NPV of \$186 million.

2. Concept 1B was the same as above, but with loop ramps instead of directional ramps for the reconfigured Marine Way interchange. This Concept had higher capital and property costs, property impacts, noise, community severance, visual impact, fuel consumption, and vehicle emissions.
3. Concept 2A was the Tree Island Crossing with one GP lane and one HOV lane in either direction. It included a partial interchange at Highway 91A and at Marine Way, and followed the Meadow Avenue alignment to Byrne Road / Marine-10th Connector. At \$217 million, the Tree Island capital cost was the highest of any Concept. At the same time, it had the potential to generate the highest user benefits, leading to the highest NPV of any Concept: \$289 million. This was because additional capacity had been provided on a shorter-distance, faster route. The Crossing benefited HOVs, inter-regional trips, pedestrians, cyclists and goods movement. However, it had high property impacts and visual intrusiveness, and it crossed highly contaminated sites as well as important aquatic and terrestrial resources. The inter-tidal and riparian vegetation in the area was identified as habitat with high productivity and diversity. As noted in the Initial MAE, there were unresolved operational and safety issues with the Highway 91A interchange.
4. Concept 3A consisted of the Marine-10th Connector and 10th Avenue with one GP lane and one HOV lane in either direction. This Concept had a high HOV mode share, leading to a high person-carrying capacity for the corridor. This in turn led to reduced travel time, operating costs, noise levels, and fuel consumption/vehicle emissions. The HOV lanes supported regional compact land use initiatives. The NPV was significant, at \$87 million.
5. Concept 3B was the same as above, but with all lanes open to GP traffic. This led to lower HOV volumes and lower user benefits, with the NPV being only \$19 million.
6. Concept 4A was the Stormont-McBride Connector with one GP and one HOV lane in either direction, on an at-grade alignment. This severed the surrounding community, had visual and noise impacts, and bisected wildlife habitat. However, it provided significant benefits by adding capacity, providing a shorter route, and encouraging HOV usage. The NPV was high, at \$164 million.
7. Concept 4B was the same as above, but in an open trench alignment. With fewer intersections and a higher speed limit, this Concept increased the user benefits. It was less intrusive on the neighbourhood, and a proposed pedestrian overpass at 13th Avenue reduced neighbourhood severance when compared with Concept 4A. Construction costs were \$14 million higher, but benefits increased even more so the NPV rose to \$187 million.

In the East-West Corridor:

1. Concept 5A featured the four-lane United Boulevard Extension (including an interchange at Brunette Avenue, to pass over the adjacent railway tracks) and modest improvements elsewhere. The full Corridor was open to GP traffic. The Extension provided a shorter route into the industrial areas of Coquitlam and New Westminster, thereby easing congestion and improving travel times and operating costs. Inter-regional trips and truck traffic benefited from the new level of accessibility provided by completing this missing link in the arterial road network. There were also significant economic development benefits, as a result of opening up developable properties that are currently blocked by congestion. The NPV was \$44 million.
2. Concept 5B was similar, except that the Corridor (excluding Front Street) was converted to have one GP lane and one HPV lane in either direction. This brought strong benefits to the truck and bus modes, with user benefits rising by \$43 million over Concept 5A. This reflected the higher value of time associated with goods movement, and led to a higher NPV of \$84 million.
3. Concept 5C was similar to 5B, except that the “bottleneck” section of Columbia Street, from Front Street to Brunette Avenue, was widened to have two GP lanes and one HPV lane in either direction. This led to increased property costs, disruption, noise, and visual obstruction. However, it improved travel conditions for inter-regional trips and general-purpose traffic, including HOVs which must share the GP lanes. As a result, the NPV rose to \$100 million.

The above represents the finding of the provincial consultants, and is provided as reference material for use by decision-makers.

NEW WESTMINSTER AREA LEVEL 2

Initial Multiple Accounts Evaluation (MAE)

The options emerging from the System-Level Analysis and carried forward to the Initial MAE were:

1. Tree Island Crossing with 0+2 lanes (i.e., 0 GP lanes and 2 HOV lanes, one in either direction) or 2+2 lanes
2. Queensborough Crossing with 4+2 lanes (i.e., via twinning of existing bridge)
3. Tree Island alignment options, each with 2+2 laning
 - Full route, from Highway 91A to Byrne Road (Marine-10th Connector) via Meadow Avenue, with an interchange at Marine Way
 - Short route, starting at Highway 91A and terminating at Marine Way with an interchange
 - Long route, extending from Highway 91A, running parallel to Marine Way on the southwest side, and terminating at Byrne Road with an interchange
4. Marine-10th Connector with 2+0 or 2+2 lanes
5. 10th Avenue 2+2 or 4+2 lanes
6. Stormont-McBride Connector with 2+2 lanes, either at grade or in a tunnel
7. Stewardson Way with 4+0 lanes (i.e., existing configuration) or 2+2 HPV
8. Front Street with 2+0 lanes (existing configuration)
9. Columbia/Brunette with 4+0 lanes (existing configuration) or 2+2 HPV
10. United Boulevard Extension with 4+0 lanes or 2+2 HPV
11. United Boulevard with 4+0 lanes (existing configuration) or 2+2 HPV

The options were analyzed using a Multiple Accounts Evaluation (MAE). The MAE structures the analysis process by dividing it into five accounts, each of which has a set of specific evaluation criteria. The five accounts were:

1. Financial Account identified the cost of building and maintaining a road.
2. Customer Service Account examined the user benefits: reduced travel time, increased safety, and reduced vehicle operating cost (fuel and maintenance).
3. Social/Community Account evaluated the impact on the surrounding human environment, including property and neighbourhood liveability.
4. Economic Account assessed the potential for economic growth that can be created by opening up land to development.
5. Environmental Account incorporated issues such as land consumption, air quality, and threats to wildlife and water.

The project incorporated two MAE analyses: Initial and Final. Each had the same five accounts. The Initial MAE was more qualitative in nature, relying primarily on descriptive terms to compare the options. The Initial MAE explored the individual components of the network, with an emphasis on how they should be defined and where they should be located. The more promising options from the Initial MAE were then carried through to the more detailed Final MAE process, which was more quantitative in nature.

In the North-South Corridor:

1. If HOV lanes are added to the Queensborough Bridge, they should be complemented by HOV lanes on 20th Street, to continue the HOV corridor up to 10th Avenue.
2. The Queensborough Bridge option involved converting the existing structure to southbound use only, with construction of a parallel bridge for northbound traffic. There would be two GP lanes and one HOV lane in either direction, with improved pedestrian and bicycle facilities. This option had lower benefits than Tree Island, but also a lower cost and fewer impacts. It was retained for further evaluation.
3. Drawbacks of The Tree Island Crossing include high cost, impact on highly sensitive habitat on the Fraser River, more visually intrusive, greater land requirements, contaminated site remediation, and impacts on wildlife and agricultural land. However, the Tree Island Crossing was still retained as an option at this point, as it provided high user benefits.
4. Tenth Avenue should not be widened to six lanes. Doing so would incur a substantial construction cost, create substantial property impacts, cause a greater sense of community severance, and promote SOV use. However, it must be recognized that choosing to retain four lanes on 10th Avenue will lead to increased congestion in this corridor.
5. For consistency in meeting the demand over the length of the corridor, Marine-10th Connector and Stormont-McBride Connector should each have four lanes. These two routes plus 10th Avenue should each have one GP lane and one HOV lane in either direction. Inclusion of the HOV lanes will increase the routes' person-carrying capacity, increase travel time savings and reduce vehicle-kilometres.
6. Tunnel and at-grade alignments were considered for the Stormont-McBride Connector. The primary trade-off is between the cost of the tunnel and the increased noise and community severance associated with the at-grade option. Based on an additional cost of \$46 million for tunnelling, and the ability to mitigate the noise impacts of the at-grade alignment, the latter was preferred. (An intermediate option, with the Connector in an open trench, was added as part of the Final MAE process which is discussed subsequently.)

In the East-West Corridor:

1. The United Boulevard Extension westward from King Edward Street to Brunette Avenue was very desirable, providing a shorter route and reduced congestion. It also improved access to developable lands in New Westminster and Coquitlam, and created a continuous goods movement route along the north shore of the Fraser River. The Extension was therefore carried through to the Final MAE.
2. The rest of the analysis of the East-West Corridor focused on the option of implementing HPV lanes to facilitate goods movement. In view of the earlier decision to restrict the corridor to four lanes, the HPV lanes would be created by converting one GP lane to HPV use in either direction. This can be done at low cost, but has a strong benefit in terms of improved goods and transit movement. Implementation of HPV lanes for the full East-West Corridor (except Front Street, which is virtually a truck-only route already) was carried through to the Final MAE.
3. While widening of the full East-West Corridor to six lanes had already been ruled out, it was decided that the Final MAE should consider six lanes on one section of Columbia Street, from Front Street to Brunette Avenue. This would ease an existing bottleneck, making it less likely that drivers would take short-cuts through residential areas.
4. Consideration was also given to some of the interchanges that would be required to support the above road options:
 - Tree Island South. The connection of the Tree Island Crossing to Highway 91A would be severely limited by surrounding residential and industrial developments, and the existing Highway 91 / Highway 91A interchange. A full-movements interchange is unrealistic, and even a good partial-movements interchange will be difficult to achieve. The preferred design accommodates all significant movements, though some would use loop ramps operating at low speed, and there are operational and safety concerns to be resolved. The other designs considered would either block key movements or have exorbitant costs, and were therefore dropped from further analysis.
 - Tree Island North. Several alignments were considered on the north side of the Fraser River. The Crossing could terminate at Marine Way, or extend up to Byrne Road (Marine-10th Connector) on an alignment either east or west of Marine Way. The termination at Marine Way would tend to overload Marine Way, focusing all traffic on a single corridor, and was therefore undesirable. Of the extensions to Byrne Road, the easterly alignment along Meadow Avenue was found to have lower costs and lower property impacts. It was therefore carried through to the Final MAE.

Queensborough Bridge North. The option to twin the Queensborough Bridge could be performed on one of two alignments. The new bridge could be parallel to the existing one, or skewed slightly to align directly with 20th Street. The latter was found to have greater land requirements, impacts to the adjacent residences, and construction costs. The parallel alignment was therefore evaluated in the Final MAE.

NEW WESTMINSTER AREA STUDY LEVEL 1

System Level Analysis

The goal of the System-Level Analysis was to evaluate corridor alternatives and eliminate options that did not meet key project objectives, which were identified as:

1. Provide for the efficient movement of people and goods by emphasizing higher occupancies, managing/optimizing the use of facilities, and ensuring that appropriate linkages are provided.
2. Provide for the safe movement of people and goods through provision of well-designed facilities for all road users.
3. Provide access to activity centres to stimulate economic development and social well-being.
4. Use Transportation Demand Management to reduce the need for private automobile travel and maximize the available capacity of facilities.
5. Give priority for strategic investments that facilitate the movement of, in descending order, people, goods, inter-regional trips, and then Single Occupant Vehicles (SOVs).
6. Support the GVRD's Compact Metropolitan Region growth plan to promote higher-density transit-oriented and automobile-restrained development.
7. Limit community and environmental impacts through careful planning that discourages the development of new facilities and promotes alternatives to the SOV.
8. Reduce agency costs through the development of partnerships with other governments, the private sector, and facility users.

Options were generated for the corridors. Some incorporated High-Occupancy Vehicle (HOV) lanes, reserved for buses and cars with at least two people. Others featured High-Priority Vehicle (HPV) lanes, for buses and trucks. The HOV and HPV concepts reflect the desire to focus on moving people and goods, not just vehicles. Most options also included General-Purpose (GP) lanes, for use by all vehicle types.

The key conclusions from the System-Level Analysis were:

1. The North-South Corridor should not be purely for GP traffic. Those options which had no HOV lanes were dropped for failing to achieve objectives related to efficiency, maximizing capacity, and regional goals.
2. The North-South Corridor should have not more than four or six lanes in any given road segment. Provision of more lanes would detract from the encouragement of HOVs, by providing too much SOV capacity. Thus, any new routes (Stormont-McBride Connector, Marine-10th Connector, and Tree Island Crossing) were limited to four lanes. Six lanes were still considered possible for expansion of the existing routes (10th Avenue and the Queensborough Bridge), provided that the additional capacity was in the form of HOV lanes.

3. The East-West Corridor should have four lanes, since widening to six lanes would have too severe an impact on existing commercial and residential properties, and would also encourage SOVs. The exception is Front Street, where existing railway and parking infrastructure would make it very difficult to achieve even four lanes. With Columbia Street available as a parallel route to share the traffic, the existing two lanes should be retained on Front Street.

The East-West Corridor should not have HOV lanes. The emphasis in this Corridor is on goods movement, and HOV lanes interfere with this by reducing the number of lanes available for truck traffic.

